

Figure 1: Audience Measurement System

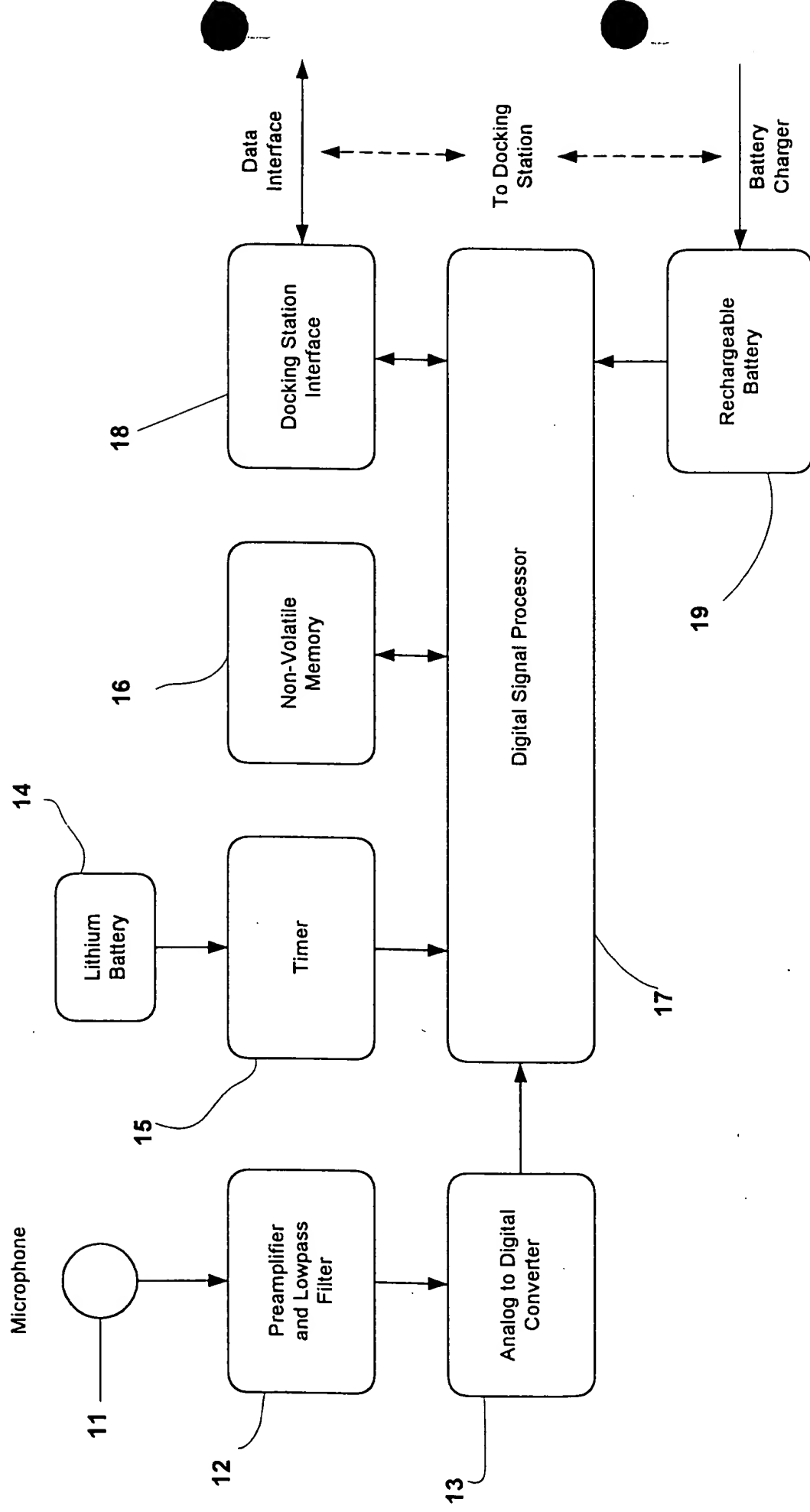


Figure 2: Portable Monitor Unit

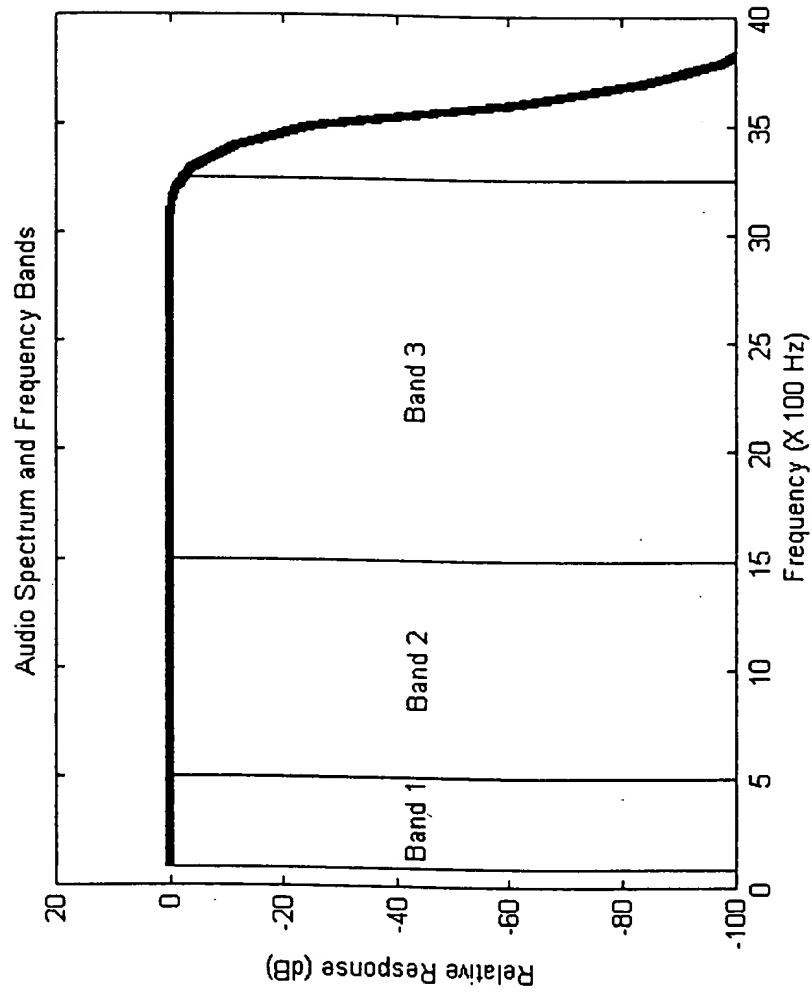


Figure 3: Audio Frequency Bands

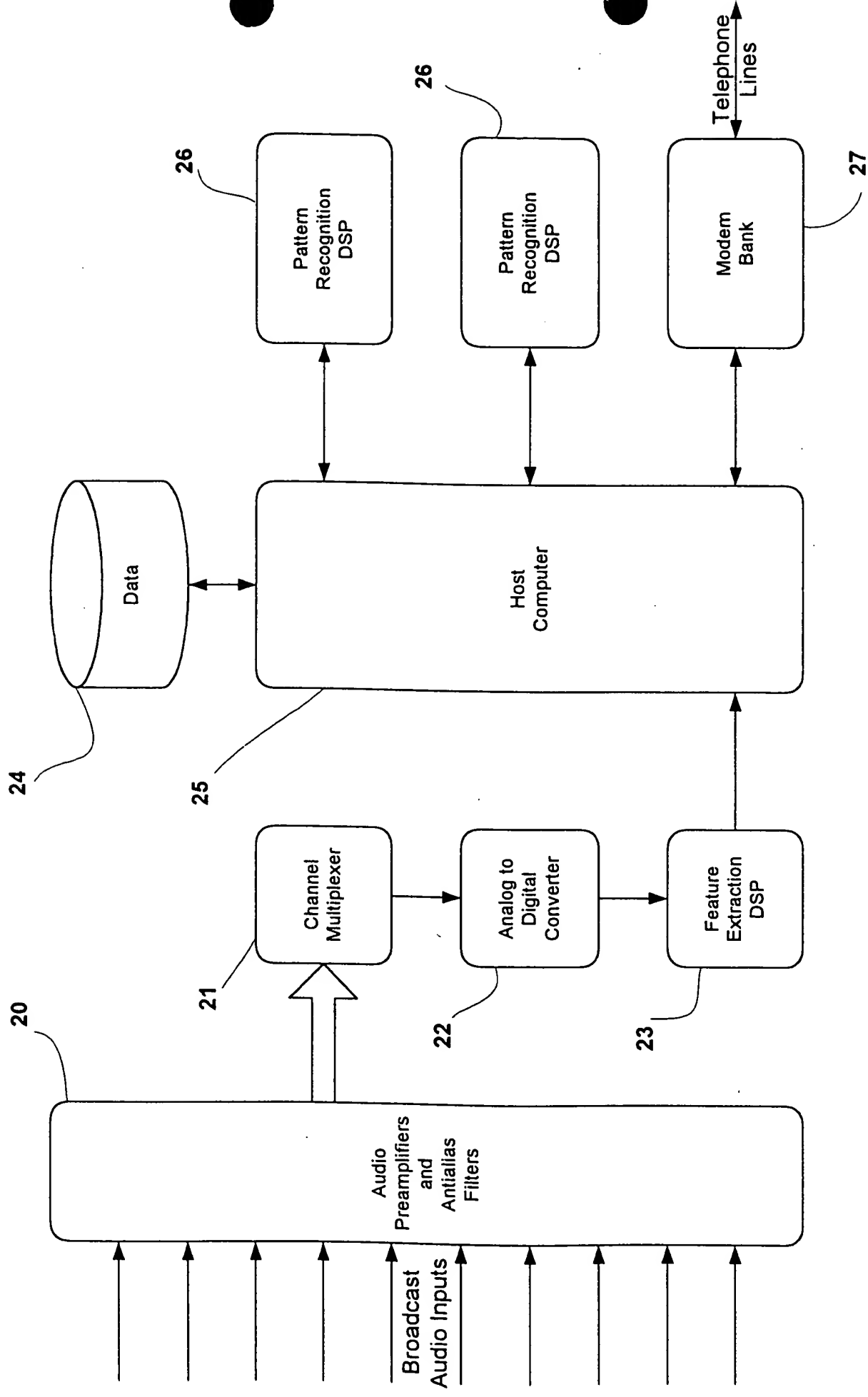


Figure 4: Central Computer System

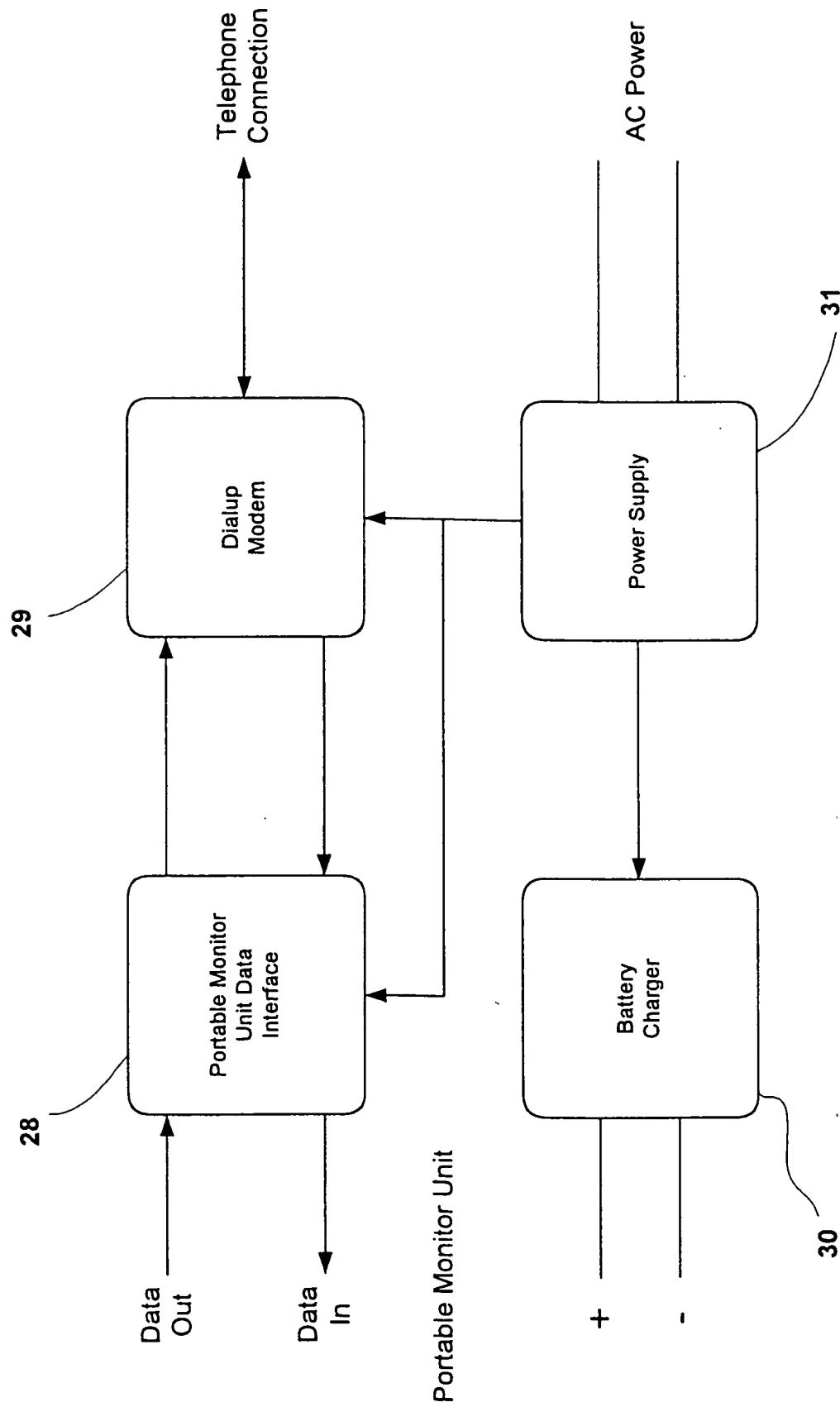


Figure 5: Portable Monitor Unit Docking Station

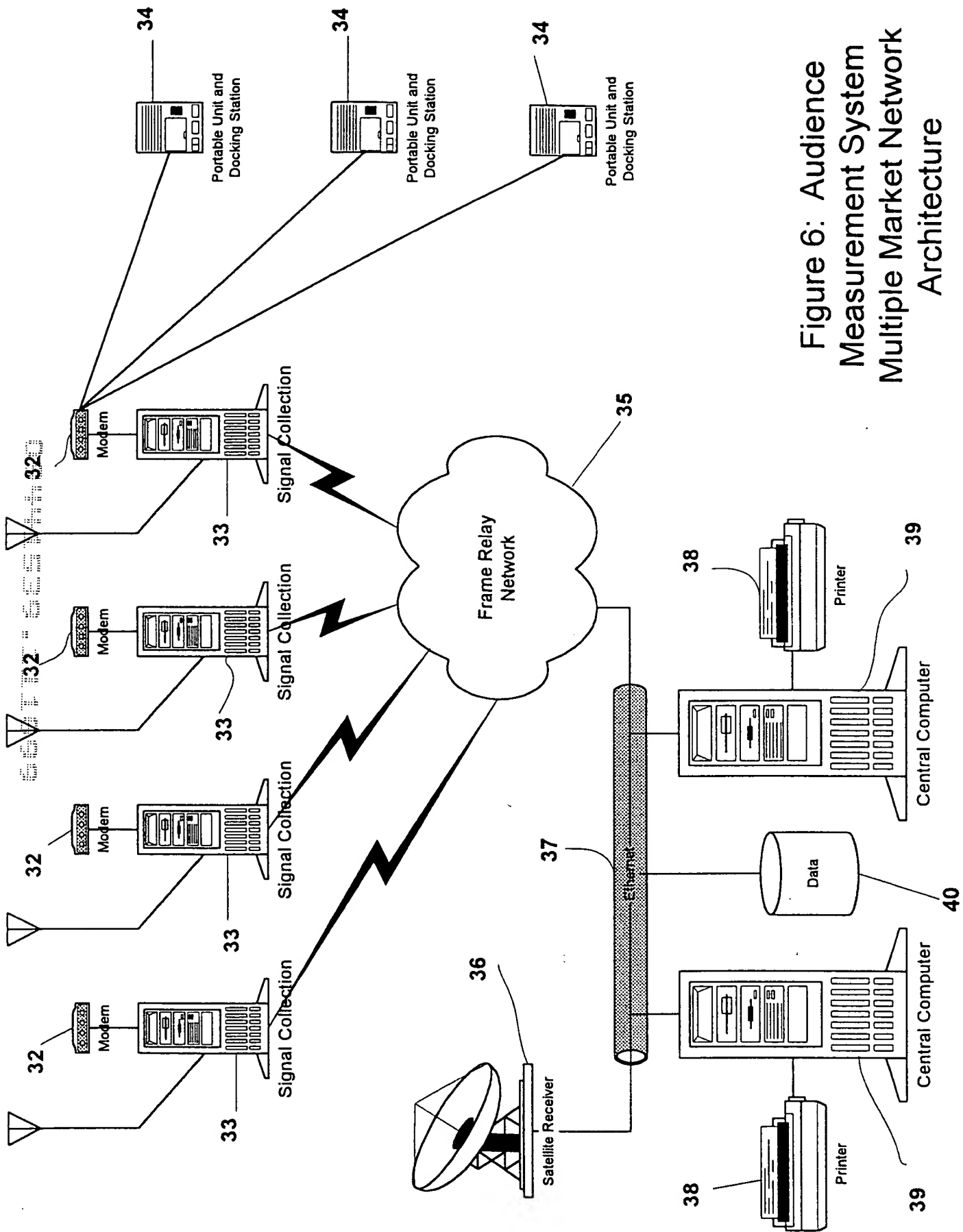


Figure 6: Audience
Measurement System
Multiple Market Network
Architecture

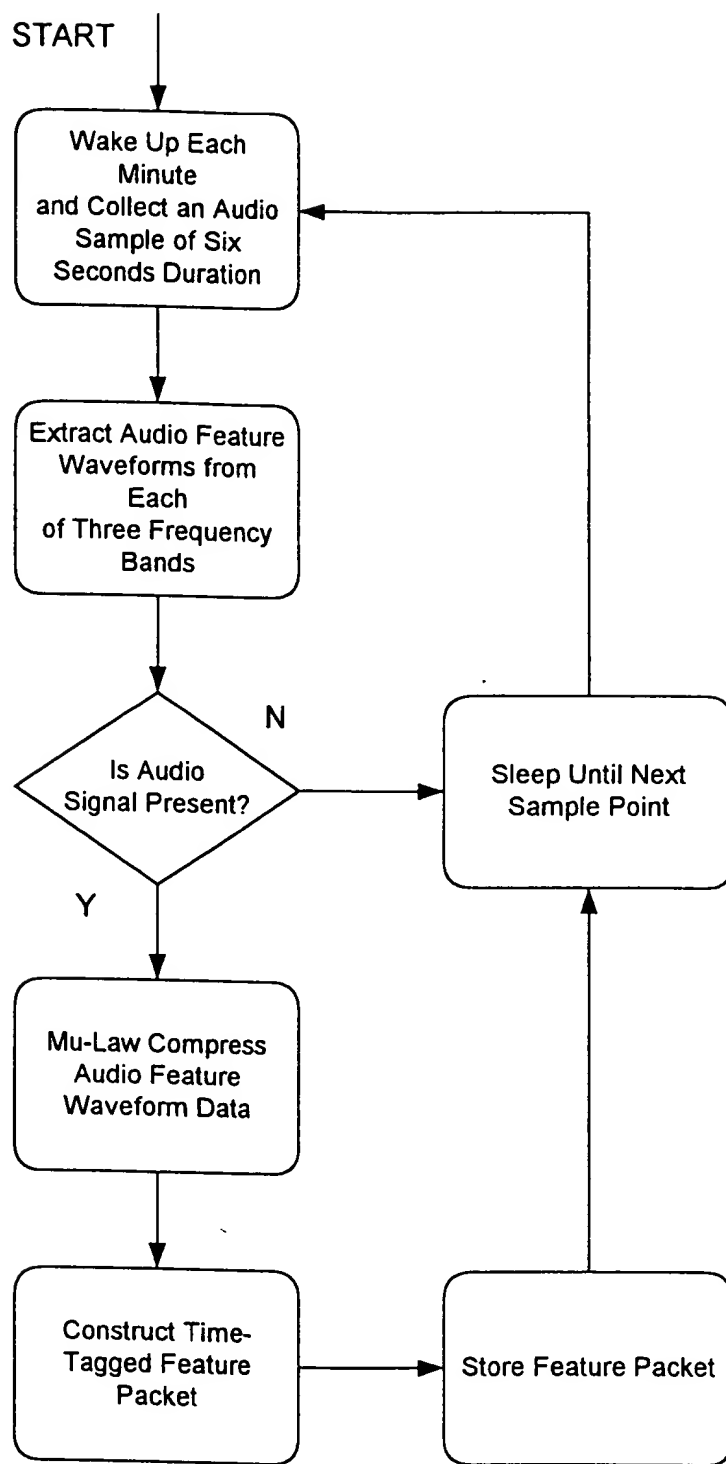


Figure 7: Portable Monitoring Unit
Audio Signal Acquisition Strategy

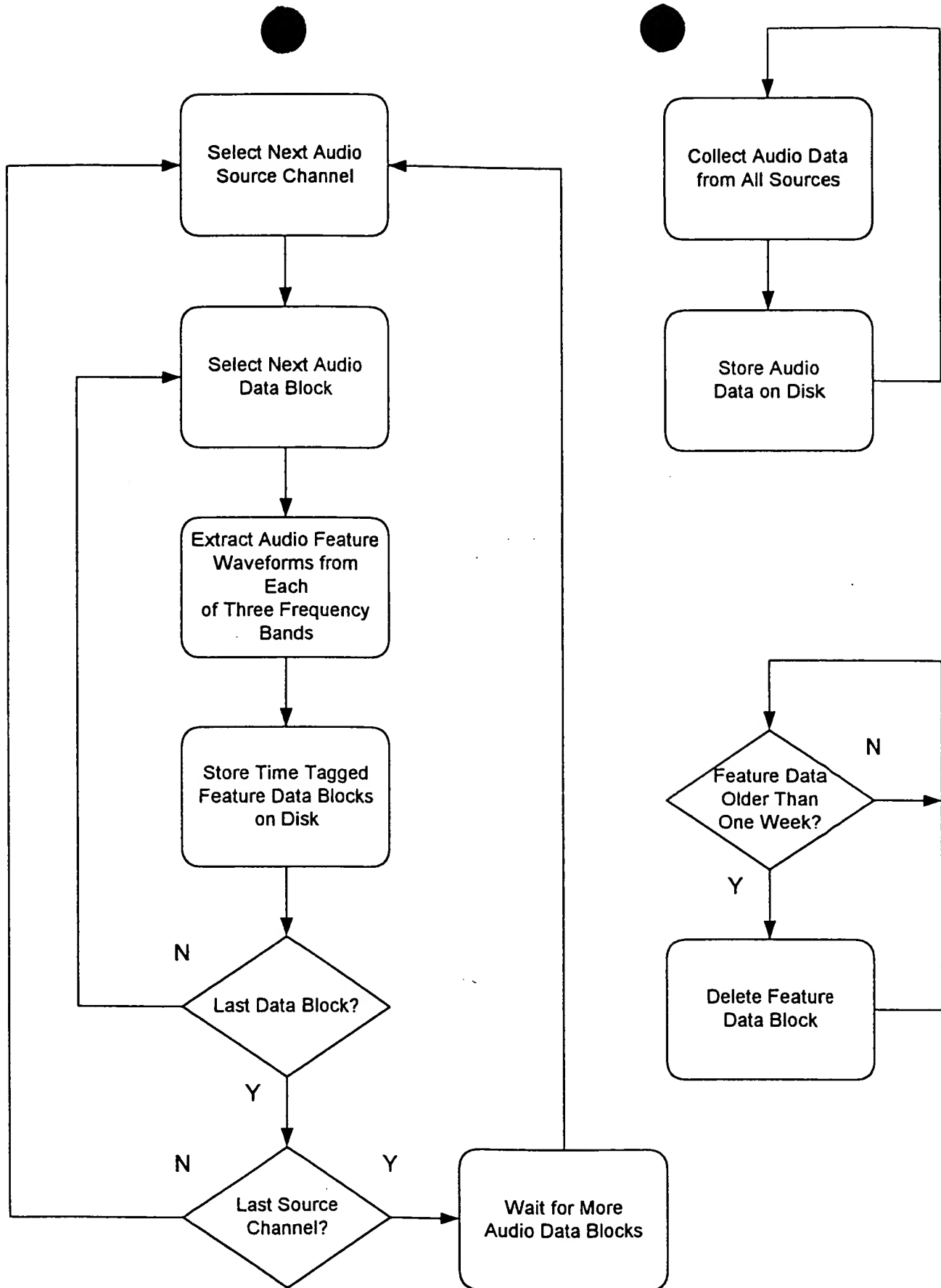


Figure 8: Central Computer Feature Extraction and Storage

START

Synchronize Time
from Portable Unit
with Central
Computer

Read Sample Packets
from Portable Unit

Find Time Matched
Source Packets on
Central Computer

Compare Unknown
Packet with Each
Source Packet

Find Source With
Minimum Weighted
Euclidean Distance

N

Y

Record Source
Unknown

Is
Distance Below
Threshold?

Record Source
Identification

Figure 9: Unknown Packet Identification Procedure

START

Normalize and
Zero-Pad Each
Band from
Unknown Packet

Construct Time-
Aligned Reference
Pattern for Each
Frequency Band

Correlate Waveforms
of Each Frequency
Band from Packet
and Reference

Compute Euclidean
Distance from Perfect
Match for Each
Frequency Band

Scale Each Distance
Component by Energy
in Reference Pattern
Component

Combine Distance
Components to Find
Total Weighted
Distance (Error)

FINISH

Figure 10: Simplified Pattern Matching Procedure

START

Time Align New
Feature Packet with
Source Reference
Pattern

Compute New
Short Term
Weighted Euclidean
Distance

Update Long Term
Exponential
Weighted Euclidean
Distance

Find Source With
Minimum Exponential
Weighted Euclidean
Distance

N

Y

Record Source
Unknown

Is
Distance Below
Threshold?

Record Source
Identification

Figure 11: Predecision Exponential Averaging of Weighted Distances